REMARKS

Claims 1 and 3-19 are now pending in this application of which claims 1, 3, 11 and 15 are being amended, and claim 2 is being canceled.

Claims 1, 11 and 15 are being amended to recite the gas inlet to receive a process gas; the gas outlet comprising first and second terminus to expel the received process gas; and the plurality of second vanes being configured to direct the process gas expelled from the second terminus across the second surface of the baffle to clean the gas distributor. This language is supported by the Specification at page 6, lines 1-34 and page 9, lines 1-14.

Further, claims 1 and 15 are being amended to include the limitations of claim 2. Claim 11 is being amended to add a plurality of first vanes and second vanes, and claim 3 is simply being amended to correct dependency. Claim 14 is being amended to correct dependency.

The claim amendments are fully supported by the originally filed Specification and original claims, and add no new matter. Thus entry of the claim amendments and reconsideration of the present case is respectfully requested.

Claim Rejections under 35 U.S.C. § 103(a)

1. The Examiner rejected claims 1-6 and 8 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,450,117 issued to Murugesh et al. in view of U.S. Patent No. 6,663,025 issued to Halsey et al. ("Halsey et al.").

To establish a *prima facie* case of obviousness under 35 U.S.C. 103(a), there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to combine the teachings of the different references. Second, there must also be a reasonable

expectation of success for such a combination. Also, the prior art references that are combined must teach or suggest all the claim limitations. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Amended claim 1 is to a gas distributor comprising a hub and a baffle extending radially outward from a hub. The hub has a gas inlet to receive a process gas and a gas outlet comprising first and second terminus to expel the received process gas. The baffle has opposing first and second surfaces, as well as an outer perimeter. There are a plurality of first vanes on the first surface, these first vanes being configured to direct the process gas expelled from the first terminus across a chamber surface. Each first vane comprising an arcuate plate that curves outward from the hub to the outer perimeter of the baffle. A plurality of second vanes are present on the second surface of the baffle, the plurality of second vanes being configured to direct the process gas expelled from the second terminus across the second surface of the baffle to clean the gas distributor.

As acknowledged by the Examiner, Murugesh et al. does not teach second vanes on the second surface of the baffle that direct the received gas across the second surface of the baffle. Nor does Murugesh et al. teach or suggest a plurality of second vanes that direct process gas from the second terminus across the second surface of the baffle to clean the gas distributor, as in amended claim 1. Instead, Murugesh et al. teaches a gas distributor having a single surface 215 with ridges 245. As seen from Figure 2A, the underside opposing surface to the surface 251 with the ridges 245, has no ridges. Further, the gas distributor in Murugesh et al. is for cleaning surfaces in a chamber, and makes no mention of being self-cleaning or capable of cleaning a surface of the baffle of the distributor:

> In one version, the cleaning gas distributor 215 directs a flow of the cleaning gas in one or more regions of, or across surfaces of, the chamber 30. The chamber regions typically have, for example, higher concentrations or thicker deposits of process residues, more difficult to clean process residues, or where excessive accumulation of process residues is harmful for subsequent wafer processing

> steps, for example, because the residues can flake off and contaminate the substrate 25. The chamber surfaces may include, for example, a surface of one of the chamber walls 45, 50 or ceiling 55, or the surface of a component in the chamber 30, such as for example, a surface of the support 40. (Murugesh et al., Col. 5, lines 46-57.)

Thus, Murugesh et al. does not teach or suggest a plurality of second vanes on the second surface of the baffle that are configured to direct the process gas expelled from the second terminus across the second surface of the baffle to clean the gas distributor, as in amended claim 1.

Halsey et al., however, fails to make up for the deficiencies of Murugesh et al. because Halsey et al. also does not teach or suggest a plurality of first vanes on the first surface of the baffle, and a plurality of second vanes on the second surface of the baffle. Nor does Halsey et al. teach that the second vanes are configured to direct the process gas expelled from the second terminus across the second surface of the baffle to clean the gas distributor. Instead, Halsey et al. teaches a diffuser with guide vanes on one surface of the diffuser and a smooth and flat surface on the opposing side of the diffuser. (Halsey et al., Figures 4A and 4B.) Moreover the diffuser in Halsey et al. is "used to vent gas into a chamber or pump the gas out of a chamber to provide a vacuum condition." (Halsey et al., Col. 7, lines 42-44.) Halsey et al. makes no mention of the distributor being self-cleaning or capable of directing the expelled process gas across the surface of the baffle to clean the gas diffuser.

Consequently, the combination of Murugesh et al. and Halsey et al. do not teach or suggest all the limitations of claim 1. Neither of the cited references teach a gas distributor comprising a baffle structure having a plurality of second vanes on the second surface of the baffle, the second vanes configured to direct the process gas expelled from the second terminus to clean the gas distributor.

Furthermore, the combination of Murugesh et al. and Halsey et al. also do not provide any suggestion or motivation that would allow one of ordinary skill in the art

to derive the claimed gas distributor structure recited in amended claim 1. As explained in the Specification, the claimed gas distributor has first vanes comprising arcuate plates that curve outward from the hub to the outer perimeter of the baffle on one of its surfaces. The gas distributor also has second vanes to flow gas expelled from the second terminus across the second surface of the baffle so that the gas flows uninhibited into the process chamber. The flow of gas across the second surface of the baffle cleans this surface; and thus, the claimed gas distributor is self cleaning. This self-cleaning action is especially useful as the second surface is susceptible to the build-up of process residues because it generally faces the substrate in the chamber, and thus, is more proximate to a process zone in which processes residues are formed in the chamber. This is a significant advantage over prior art gas distributors which allow build-up of residues on surfaces exposed to the plasma or process gas environment in the chamber, and do not provide a directed flow stream of cleaning gas. The combination of Murugesh et al. and Halsey et al. simply does not provide any suggestion or motivation that would allow one of ordinary skill in the art to derive the advantages of a gas distributor structure having first and second vanes on opposing surfaces, as recited in claim 1.

For these reasons, the combination of Murugesh et al. and Halsey et al. does not provide a prima facie obviousness rejection of claim 1 or the claims dependent therefrom. Accordingly, the Examiner is respectfully requested to allow claim 1 and the claims dependent therefrom.

2. The Examiner further rejected claim 7 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,450,117 issued to Murugesh et al. in view U.S. Patent No. 6,663,025 issued to Halsey et al. ("Halsey et al.") as applied to claim 1 and further in view of U.S. Published Application No. 2003/0116278 issued to Wheat et al.

Claim 7 depends upon claim 1 and is patentable for the same reasons as claim 1, namely Murugesh et al. in view of Halsey et al., does not render claim 1 obvious, as the cited references do not teach or suggest the claimed invention.

Wheat et al. falls to make up for the deficiencies of Murugesh et al. and Halsey et al. because Wheat et al. also does not teach or suggest a plurality of first vanes on the first surface of the baffle, and a plurality of second vanes on the second surface of the baffle that direct the process gas expelled from the second terminus across the second surface of the baffle to clean the gas distributor. Instead, Wheat et al. teaches "...an angular gas baffle or deflector 34 which is show in FIG.1 as having an open generally trapezoidal or 'hooded' configuration or shape." (Wheat et al., paragraph [0032], lines 1-4.) Further, the gas baffle in Wheat et al. has smooth top and bottom surfaces without any vanes. (Wheat et al., Figs. 1 and 2.) Also Wheat et al. does not teach a baffle comprising a first surface with "first vanes comprising arcuate plates that curve outward from the hub to the outer perimeter of the baffle on the first surface of the baffle", as in claim 1. Nor does Wheat et al. teach second vanes on the second surface of the baffle that comprise a plurality of wedges, as recited in claim 7.

Further, the gas distributor of Wheat et al. is not configured to be self-cleaning, as in amended claim 1. That is to say, the gas distributor of Wheat et al. does not teach or suggest second vanes configured to direct the process gas expelled from the second terminus across the second surface of the baffle to clean the gas distributor. Instead, Wheat et al. is to a "gas distributor suitable for introducing a carrier gas at the top of a coating container used to provide metallic coating on articles." (Wheat et al., Abstract.) Wheat et al. makes no mention of the gas distributor being able to pass a gas along a surface of the distributor to clean such surface.

Therefore, the combination of Murugesh et al., Halsey et al. and Wheat et al. do not provide any suggestion or motivation to direct one of ordinary skill to derive the gas distributor of independent claim 1, or that of claim 7. Thus, claim 7 is patentable over Murugesh et al. in view of Halsey et al. and Wheat et al. Accordingly, the Examiner is respectfully requested to allow claim 7.

3. The Examiner further rejected claims 9 and 15-19 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,450,117 issued to Murugesh et al. in view of U.S. Patent No. 6,663,025 issued to Halsey et al. as applied to claim 1 and further in view of U.S. Published Application No. 2004/0200412 issued to Frijlink.

Claim 9 depends upon claim 1 and is patentable for the same reasons as claim 1, namely Murugesh et al. in view of Halsey et al. does not render claim 1 obvious, as the cited references do not teach or suggest all the limitations of claim 1.

However, Frijlink fails to make up for the deficiencies of Murugesh et al. and Halsey et al. because Frijlink also does not teach or suggest a plurality of first vanes on the first surface of the baffle, and a plurality of second vanes on the second surface of the baffle which direct the process gas expelled from the second terminus across the second surface of the baffle to clean the gas distributor. Instead, Frijlink teaches a process chamber with isolation means to "prevent the reactive gases from flowing into spaces of the reactor other than the space immediately above the substrate holders and the wafers." (Frijlink, paragraph [0027], lines 1-4.) "A cylindrical isolation element referred [sic] to as outer ring 10." (Frijlink, paragraph [0028], lines 1-2.) Frijlink further teaches:

> "...seal means are small grooves or roughened zones of surfaces of the interfaces of the isolation elements above-described. In the embodiment of FIG. 1, the seal means structures are applied to the flat contact surfaces of the outer ring 10 at the interfaces with the cover plate 20 and the base plate 30. The seal means structures according to the invention avoid the processing gases from existing through said interfaces, and force said process gas through the outlets 12 and then through the exhaust plenum 29. These seal means do not allow those process gases to enter the spaces 102, 103."
> (Frijlink, paragraph [0032], lines 1-11.)

Thus, Frijlink does not teach or suggest a plurality of first vanes on the first surface of the baffle, and a plurality of second vanes on the second surface of the baffle that direct the process gas expelled from the second terminus across the second surface of the

baffle to clean the gas distributor.

Also Frijink et al. does not teach a baffle comprising a first surface having a plurality of first vanes comprising arcuate plates that curve outward from the hub to the outer perimeter of the baffle on the first surface of the baffle, as recited in claim 1. In addition, Frijink et al. does not teach a gas distributor having a hub comprising a gas feed-through tube capable of allowing a process gas to bypass the first and second vanes and enter the chamber, as claimed in claim 9.

For these reasons, claim 9 is not obvious over Murugesh et al., in view of Halsey et al., and further in view of Frijink et al..

Claim 15

The combination of Murugesh et al., Halsey et al. and Frijink et al. does not teach claim 15, as amended, which recites, inter alia, a plurality of first vanes on the first surface of the baffle, the plurality of first vanes configured to direct the process gas expelled from the first terminus across the enclosing walls and interior chamber surfaces, each first vane comprising an arcuate plate that curves outward from the hub to the outer perimeter of the baffle; and a plurality of second vanes on the second surface of the baffle, the plurality of second vanes configured to direct the process gas expelled from the second terminus across the second surface of the baffle to clean the gas distributor, for the same reasons as presented above with respect to claim 1.

For at least the reasons presented above with respect to claim 1, independent claim 15 and the claims dependent therefrom, claims 16-19, are patentable over Murugesh et al. in view of Halsey et al. and Frijlink.

4. The Examiner rejected claim 10 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,450,117 issued to Murugesh et al. in view of U.S. Patent No.

6,663,025 issued to Halsey et al. as applied to claim 1 and further in view of U.S. Patent No. 6,132,512 issued to Horie et al..

Claim 10 is to a combination process and cleaning gas distributor comprising the gas distributor according to claim 1. The process gas distributor has a process gas inlet and a showerhead gas distribution faceplate. Claim 10 is dependent on claim 1, and is patentable over the combination of Murugesh et al. and Halsey et al., because, as discussed above, these references do not teach or suggest a plurality of first vanes on the first surface of the baffle, and a plurality of second vanes on the second surface of the baffle that direct the process gas expelled from the second terminus across the second surface of the baffle to clean the gas distributor., as in amended claim 1.

Horie et al., however, fails to make up for the deficiencies of Murugesh et al. and Halsey et al. because Horie et al. also does not teach or suggest a baffle having first vanes on the first surface of the baffle and second vanes on the second surface of the baffle. Halsey et al. also does not teach that the second vanes are configured to direct process gas across the second surface of the baffle to clean the distributor. Instead, Horie et al. teaches "a gas ejection head for use in a vapor-phase thin-film growth apparatus, comprising a planar nozzle head body having a plurality of nozzle orifices for uniformly ejecting a film deposition therethrough." (Horie et al., Col. 4, lines 54-57.) Horie et al. further teaches:

> "...the gas injection head includes a nozzle head body 20 which comprises a disk 21 having a plurality of parallel fitting grooves 21a defined in an upper surface thereof and a plurality of parallel fitting grooves 21a defined in a lower surface thereof. The fiiting grooves 21a defined in the upper and lower surfaces of the disk 21 extend perpendicularly to each other. Slender liquid passage members 22, each having a channel-shaped cross section defining a liquid passage groove 23, are fitted in the respective fitting grooves 21a defined in the upper and lower surfaces of the disk 21, with the liquid passage grooves 23 opening toward the bottoms of the fitting grooves 21a."

(Horie et al., Col. 8, line 59 to Col. 9, line 3 and Fig. 8A, 8B and 8C)
Thus, Horie et al. does not teach or suggest even a baffle having first vanes on the first surface of the baffle and second vanes on the second surface of the baffle, as in claim 1.

For at least these reasons, claim 10 is patentable over Murugesh et al. in view of Halsey et al. and Horie et al.

5. The Examiner rejected claims 11-14 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,182,602 issued to Redeker et al. in view of U.S. Patent No. 6,450,117 issued to Murugesh et al., U.S. Patent No. 6,663,025 issued to Halsey et al., and U.S. Published Application No. 2004/0200412 issued to Frijlink.

The combination of Redeker et al., Murugesh et al., and Halsey et al., and Frijink et al. do not teach claim 11 which is to a self-cleaning gas distributor to distribute a process gas from an external source across surfaces in a substrate processing chamber having a wall with a cavity.

As acknowledged by the Examiner, Redeker et al. does not teach a gas distributor having a first channel along external surface of hub; a baffle plate extending radially outward from the hub, the baffle plate comprising first and second surface, an outer perimeter, and an aperture capable of allowing passage of the gas along the second channels; a plurality of first vanes on the first surface of the baffle plate, each first vane comprising an arcuate plate that curves outward from the hub, a plurality of second vanes on the second surface of the baffle plate, each second vane comprising a surface inclined to the second surface of the baffle plate; whereby the first vanes direct the gas across the surfaces of the chamber, the second vanes direct the gas across the second surface of the baffle plate, and the a gas feed-through tube that allows the gas to by pass the first and second set of vanes.

As further acknowledged by the Examiner, Redeker et al. in view of

Murugesh et al. does not teach second vanes on the second surface of the baffle and where second vanes direct the received gas across the second surface of the baffle.

Halsey et al. fails to make up for the deficiencies of Redeker et al. and Murugesh et al. because Halsey et al. does not teach or suggest a baffle having first vanes on the first surface of the baffle and second vanes on the second surface of the baffle, as discussed above. Instead, Halsey et al. teaches a diffuser with guide vanes on the surface of one side of the diffuser and a smooth and flat surface on the opposing side of the diffuser.

As presented above, Frijlink fails to make up for the deficiencies of Murugesh et al., and Halsey et al. because Frijlink does not teach or suggest a baffle having first vanes on the first surface of the baffle and second vanes on the second surface of the baffle. Instead, Frijlink teaches a process chamber with isolation means to prevent the reactive gases from flowing into spaces of the reactor other than the space immediately above the substrate holders and the wafers. Thus, Frijlink does not teach or suggest a baffle having first vanes on the first surface of the baffle and second vanes on the second surface of the baffle, nor does it teach a plurality of second vanes configured to direct the process gas expelled from the second terminus across the second surface of the baffle plate to clean the gas distributor, as in claim 11.

For these reasons, independent claim 11 and the claims dependent therefrom, claims 12-14, are patentable over Redeker et al. in view of Murugesh et al., Halsey et al. and Frijlink.

CONCLUSION

For the foregoing reasons, allowance of the instant application is respectfully requested. Should the Examiner have any questions regarding the above amendments or remarks, the Examiner is requested to telephone Applicant's representative at the number listed below.

Respectfully submitted,

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